Cataract Extraction with the Erisophake

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SUMMARY

Today the erisophake offers the most successful means for the intracapsular extraction of cataracts. The advantages of this method are that no counterpressure is required so that the incidence of vitreous loss is reduced; the vacuum cup provides a firmer grasp of the lens with less danger of rupture of the lens capsule; and the vacuum cup can be used for the delivery of practically all types of cataract in the adult, including intumescent and Morgagnian cataracts as well as lenses with exfoliating and friable capsules.

While the forceps method of intracapsular extraction is generally successful in not more than 70 to 75 per cent of cases, the erisophake may offer success in 90 per cent of cases.

THE intracapsular method of cataract extraction has been proven superior to the extracapsular procedure in most instances, but perfection in this operation is yet to be achieved. The erisophake was introduced to the armamentarium of ophthalmic surgery 40 years ago by Hulen[8] of San Francisco for the specific purpose of correcting some of the obvious defects of the forceps method of lens extraction and at the same time to increase the efficiency of the intracapsular technique. Although the suction apparatus that he used was quite crude in design, Hulen demonstrated that the vacuum cup permitted a firmer control of the lens and made possible a higher proportion of intracapsular extractions without the use of external pressure and with less danger of rupture of the lens capsule or loss of vitreous. Further interest in the use of the erisophake was stimulated by Barraquer's[1] success with the motor-driven "pneumatic forceps" which he presented in 1917, and by Dimitry's[5] suction instrument. However, many surgeons of that period did not share the enthusiasm for this newer method of cataract extraction, and even today a cloud of skepticism hangs over the erisophake. For the most part, the disapproving murmurs still to be heard are the echoes of opinions expressed ten to twenty years ago by surgeons who found the suction machine mechanically inefficient and too awkward. Crossley[4] quoted Smith as declaring in 1923 that the suction apparatus was not reliable enough to warrant its use, and Wright[16] added the weight of his disapproval. In 1942, Kirby[9] described the equipment for phacoerisis as too complicated and pointed out that in spite of Barraquer's reported success in Spain, he failed to make an impressive demonstration of the erisophake when he used it in American clinics. The inadequacies of the suction apparatus in the past have erroneously identified it in many minds with such complications as permanent vitreous changes, intraocular hemorrhage, and the accidental aspiration of vitreous.

Until the development of the erisophake, the very essence of the intracapsular technique of cataract extraction was the use of the capsule forceps. At best, however, the forceps method of lens extraction has proven far from perfect. Recent evaluations of the present status of the intracapsular operation made by Knapp,[10] Kirby,[9] and Castroviejo,[3] showed that the forceps method succeeds in little more than 70 to 75 per cent of cases, with rupture of the lens capsule in approximately 20 to 30 per cent of cases, loss of vitreous in at least 5 per cent, and inability to grasp the capsule with the forceps in 10 per cent of cases.

The traction-counterpressure technique, as usually carried out with the capsule forceps and muscle hook, depends for success on a very delicate balance between the tension exerted on the lens capsule by the forceps and the pressure applied to the vitreous body. Too often the operation falls short of success simply because either the hyaloid membrane or the lens capsule is too weak to withstand the minimal force required to rupture the zonules and extract the lens. Loss of vitreous is certainly one of the major defects of the forceps technique. Vitreous loss in cataract operations depends primarily on the amount of pressure-manipulation to which the vitreous body is subjected. Great has been the diversity of opinion regarding the solution of this problem, and the common approach has been focused on the relative amounts of traction and pressure that should be exerted during the lens extraction maneuver. Lagrange, Spaeth, and Arruga have advocated almost the exclusive use of traction, while Smith went to the opposite extreme and relied on pressure alone for lens delivery. Careful studies on the dynamics of the vitreous body were recently made by Harrington[7] who showed that some of the complications incident to the forceps method of cataract extraction can be reduced by the proper application of pressure on the vitreous body. It is obvious, however, that the frequency of vitreous loss can never be reduced beyond a very significant percentage by a technique of cataract extraction which uses the vitreous as a hydrostatic wedge to rupture the zonules and dislodge the lens from the hyaloid fossa.

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The erisophake offers four important advantages over the forceps method of intracapsular cataract extraction:

1. The necessity of applying pressure on the vitreous body is greatly reduced.

2. The lens capsule is less often ruptured.

3. The broad, firm grasp of the suction cup on the capsule permits constant control of the lens during the maneuver of extraction.

4. All types of cataracts in adults can be extracted with the erisophake.

The use of the suction instrument has made possible the intracapsular delivery of cataract types which too often defy the successful application of the capsule forceps. The rubbery capsule of the intumescent lens and the thin capsule of the sclerosed, exfoliating, and Morgagnian cataracts present considerable problems when forceps are used but are not particularly hazardous when the erisophake is used. Castroviejo[3] stated that "with the erisophake the type of cataract does not have any influence" and that "the number of intracapsular extractions obtained with it is greater than in the best statistics by the method of forceps and the complications are not greater than by the other methods." Thomas[12,13] used a modification of the Dimitry instrument and in an excellent survey of the status of phacoerisis pointed out that the suction method may be used to greatest advantage in cases "in which the lens is hypermature, and in which the capsule is tense, exfoliated, or friable and will not stand any tension." Wolfe and Blaess[15] summarized their series of 100 cataract extractions by the Barraquer method in which intracapsular extraction was achieved in 91 per cent of cases; the visual acuity was 20/20 or better in 90 per cent of cases, and the results of the operation were successful in 99 per cent of cases. Other strong advocates of the erisophake are Nugent,[11] Fisher,[6] and Veirs.[14]

For cataract extraction with the erisophake, the motor-driven instrument has proved very dependable. The model designed by Castroviejo delivers a vacuum ranging from 55 to 65 cm. of mercury and has the advantage that the relatively constant vacuum can be controlled by the operator through an electric foot switch. No awkward manipulation, such as that necessary with the Dimitry syringe, is required to reestablish suction.

OPERATIVE TECHNIQUE

An erisophake extraction is made easier if the pupil is well dilated, and for that purpose 5 per cent homatropine and 10 per cent Neosynephrin® are instilled about 45 minutes before operation. The addition of hyaluronidase to the procaine-epinephrine combination greatly improves the effectiveness of the O'Brien and retrobulbar anesthesia. The corneal section is then performed; corneal sutures are inserted; and the corneal section is enlarged to 180 degrees. Iridectomy is then done, although an extraction may be carried out through a round pupil. It is advisable to elevate the corneal flap while introducing the suction instrument into the anterior chamber so that the suction cup can be accurately applied to the lens capsule without contact with the corneal endothelium or the iris. A firm but delicate grasp of the lens capsule is achieved as soon as the vacuum pump is turned on. The maneuver of cataract extraction with the erisophake is far simpler than when capsule forceps are employed. Except in those cases in which the zonules are relatively tough, little if any pressure need be applied to the vitreous body because the initial traction on the lens capsule by the vacuum cup often breaks many of the zonular attachments and a slight side-to-side rocking of the cataract completes the rupture of the zonules. The lens can be tumbled in the orthodox manner, but it is easier to roll the cataract out or slide it out "head first." Counterpressure is limited to the small amount needed to guide the lens through the corneal section. If the suction cup is tilted away from the lens capsule, the vacuum may be momentarily interrupted, but the surgeon can immediately restore the suction of the motor-driven instrument by merely reapplying the cup to the lens. If on rare occasion the lens capsule breaks during the delivery, the operation can be continued as an extracapsular procedure.

The surgeon who uses the erisophake has the gratifying assurance that the vast majority of cataracts in the adult can be extracted intracapsularly without loss of vitreous and with excellent visual results. In the author's surgical series, intracapsular extraction was achieved in only 62 per cent of cases when the forceps were employed, but since the erisophake was adopted the percentage of successful intracapsular deliveries has risen to approximately 90 per cent and there have been no complications.

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Discussion by MAURICE W. NUGENT, M.D., *Los Angeles*

I cannot recommend this method of cataract extraction too highly. I have used the Castroviejo suction kit in over 200 consecutive cases of adult cataract, and intracapsular extraction was obtained in 92 per cent. Vitreous loss occurred in 4 per cent of cases. Surgically, the results could be represented by a figure of 98 per cent.

In this series there were mature and immature senile cataracts both nuclear and cortical, capsular cataracts, diabetic cataracts and cataracts secondary to glaucoma and surgical treatment for that disease, and to iridocyclitis. Two capsules were broken in cataract extractions that followed iris inclusion operations, but results were excellent. In other words, no attempt was made to select cases. No complication occurred that could in any way be attributable to this method of extraction.

Corneal section was used in all cases, and one, two or three corneoscleral silk sutures were used (I recommend three or at least two). A bubble of air was almost always placed in the anterior chamber at the end of operation. Round pupils (with peripheral iridectomy or iridotomy) were easily obtained. However, I would like to go on record as stating that I definitely prefer complete basal iridectomy in cataract extractions, no matter what method is used in removing the lens. My reason for this is that extraction is usually easier and postoperative complications definitely less.

In using suction I prefer to place the cup at or just below the center of the lens and to use a minimum of counterpressure. The cup, when in place, should be moved from side to side as with forceps, with some attempt to create torsion by horizontal rotation. Then, when zonules are adequately broken, the lens may be delivered by elevation and sliding.

Dr. Alexander's statements and experiences are so similar to mine that further discussion would only be repetitious.